Claims

1. A pattern forming method which is characterized by:

forming a liquid-repellent thin film on an insulating surface;

selectively providing affinity for liquid with a surface of the thin film by plasma generating means; and

forming a pattern by discharging a drop composition to the surface having affinity of liquid of the thin film by drop discharging means.

2. A pattern forming method which is characterized by:

forming a thin film having affinity for liquid on an insulating surface;

selectively forming a groove or a hole in a surface of the thin film by plasma generating means; and

forming a pattern by discharging a drop composition to the groove or the hole in the thin film by drop discharging means.

3. A pattern forming method according to claim 1 or claim 2, wherein the drop composition is selected from the group consisting of a conductive material, a resist material, a polymer material and a light emitting material.

4. A pattern forming method according to claim 1, wherein the liquid-repellent thin film is selected from the group consisting of a semiconductor film, a conductive film and a polymer film.

5. A pattern forming method according to claim 2, wherein the thin film having

affinity for liquid is selected from the group consisting of a silicon oxide film, silicon nitride film, a silicon oxynitride film and a metal oxide film.

6. A pattern forming method according to claim 1 or claim 2, wherein a pressure each of the plasma generating means and the drop discharging means is in a range of 1.3 x 10^1 to 1.31 x 10^5 Pa.

7. A pattern forming method according to claim 1 or claim 2, wherein a contact angle θ of the surface having affinity for liquid is $0° \leq \theta < 10°$, and a contact angle θ of the liquid-repellent surface is $10° \leq \theta < 180°$.

8. A drop discharging apparatus which is characterized by:

plasma generating means which makes a surface of a liquid-repellent thin film selectively have affinity for liquid by using a plasma generated by applying a high frequency or a pulsed voltage to a first electrode or a second electrode in a condition where a process gas is introduced between the first electrode and the second electrode; and

drop discharging means which forms a pattern by discharging a drop composition to the surface having affinity for liquid of the thin film.

9. A drop discharging apparatus which is characterized by:

plasma generating means selectively forms a groove on a surface of a thin film having affinity for liquid by using a plasma generated by applying a high frequency or a pulsed voltage to a first electrode or a second electrode in a condition where a process gas is introduced between the first electrode and the second electrode;

and

drop discharging means which forms a pattern by discharging a drop composition to the groove.

10. A drop discharging apparatus according to claim 8 or claim 9, which has a structure in which the plasma generating means and the drop discharging means are integrated, or a structure in which a continuous process is possible.

11. A drop discharging apparatus according to claim 8 or claim 9, wherein the plasma generating means comprises an electrode on which a pair of solid dielectric material is installed, and a high frequency or a pulse power source which is introducing a process gas between electrodes.

12. A drop discharging apparatus according to claim 8, wherein the liquid-repellent thin film is selected from the group consisting of a semiconductor film, a conductive film and a polymer film.

13. A drop discharging apparatus according to claim 9, wherein the thin film having affinity for liquid is selected from the group consisting of a silicon oxide film, a silicon nitride film, a silicon oxynitride film and a metal oxide film.

14. A drop discharging apparatus according to claim 8 or claim 9, wherein a pressure each of the plasma generating means and the drop discharging means is in a range of 1.3×10^{1} to 1.31×10^{5} Pa.

15. A drop discharging apparatus according to claim 8 or claim 9, wherein a contact angle θ of the surface having affinity for liquid is $0° \leq \theta < 10°$, and a contact angle θ of the liquid-repellent surface is $10° \leq \theta < 180°$.